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ABSTRACT

The South Carolina Office of Vocational Education directed the development of a set of curriculum materials for industrial sewing courses as a resource tool for South Carolina teachers. The materials consist of 20 individualized self-instructional modules, a glossary of terms, and a teacher guide. During the 1981-82 school year, the Research Coordinating Unit in conjunction with the Curriculum Development Section conducted a field test study to determine the accuracy and usefulness of the materials. During the field test, a control group design was used in which student achievement in 11 implementing classrooms (experimental group) was compared to student achievement in 11 classes that did not use the materials (control group). At the start of each semester, before instruction began, a pretest covering content that was to be taught was administered, and a posttest was administered at the end of each semester. Analysis of the data gathered by means of pre- and postachievement tests provides strong evidence that the materials are effective in promoting student learning. In spite of an initial disadvantage with respect to entry knowledge, the experimental group obtained higher posttest mean scores, and in most cases the differences between the mean scores in the two groups were significant. It was recommended that particular attention be paid to suggested revisions in those modules for which the posttest scores were not significantly higher in favor of the experimental group. Even without revisions, however, the data indicate that students taught through the modules do achieve higher scores following instruction; therefore, distribution of these materials should provide a useful resource for teachers of industrial sewing in the state. (KC)

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A FIELD TEST OF INDUSTRIAL SEWING CURRICULUM MATERIALS

Student Achievement

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SECTION I

INTRODUCTION

Background

The South Carolina Office of Vocational Education, Curriculum Development Section, directed the development of a set of curriculum materials for industrial sewing courses as a resource tool for South Carolina teachers. The materials consist of twenty individualized self instructional modules, a glossary of terms, and a teacher's guide. The materials are intended to be used in two semesters with modules one through nine to be presented in the first semester and modules ten through twenty in the second semester.

During the 1981-82 school year, the Research Coordinating Unit, in conjunction with the Curriculum Development Section, conducted a field test study to determine the accuracy and usefulness of the materials.

Description of the Field Test

The goal of the field test of the curriculum materials was to generate data directed at determining the usability and effectiveness of the curriculum guide and, if necessary, the types of revisions required to improve it. In order to meet this goal, four specific objectives guided the project. These objectives were:

1) to determine the manageability of the materials for classroom use

2) to determine the content accuracy of the materials

3) to determine teacher attitudes toward the materials

4) to verify the extent to which student achievement occurs following implementation.

The primary design components of the field test plan were: 1) the field testing of the complete set of instructional materials in eleven industrial sewing classes in the state, 2) the participation of eleven control classes which did not use the instructional materials and constituted a comparison group for pre and posttest results, and 3) a content review of the instructional materials by the eleven implementing teachers and by South Carolina Needle Trades Associate members. It was on the basis of data generated by these design components that recommendations regarding revisions of the materials were to be developed.

Data Collection Techniques for Objectives 1 - 3

Data relating to objectives 1 - 3 were collected primarily from two sources. First, implementing teachers were asked to write comments directly in one set of the instructional materials as they used them during the field test year. On these modules, the teachers were asked to record the following types of information:

1. Any problems encountered in using the materials and suggestions for improving their manageability.
2. Errors in accuracy of content of the materials and suggestions for correcting any such errors or misinformation.
3. Opinions as to whether any of the content is superfluous and should be deleted.
4. Opinions as to whether any sections of the materials need to be expanded by additional content or information.

In addition to this review by teachers, the materials were examined by members of the South Carolina Needle Trades Associate. After this examination, reviewers submitted comments regarding the accuracy and relevance of the content of the materials. The review comments from both the implementing teachers and the Trade Association members were submitted to

the Curriculum Development Section project coordinator for analysis. On the basis of these comments, revisions of the materials were planned.

Format of the Report on Objective 4

The Research Coordinating Unit of the Office of Vocational Education was responsible for gathering information regarding study objective 4--to verify the extent to which student learning occurs following implementation of the materials. This report is intended to describe the methodology and procedures which were followed in meeting objective 4, to present the results and to make recommendations based on these results. In Section II, a description of the methods and procedures followed will be presented.

Section III will contain an explanation of the data analysis procedures and will present the results. Section IV will present conclusions and recommendations based on the findings of the study on objective 4. A glossary containing definitions of technical terms used in the report is included in the back of this report.

SECTION II

METHODS AND PROCEDURES

Management of the Field Test

The study plan regarding objective four 'to verify the extent to which student learning occurs following implementation of the materials) called for a control group design in which student achievement in the eleven implementing classrooms (hereafter also referred to as "experimental group") was compared to student achievement in eleven classes which did not use the materials (hereafter also referred to as "control group"). The management of this design was accomplished by the following activities:

1) Identification of the implementation and control group classes. The twenty-two participating teachers were selected and contacted by the Office of Vocational Education Assistant Supervisor for Trade and Industrial Education. Following this initial contact, the appropriate school superintendent and center directors were telephoned, and permission for the participation of the teachers was requested. In all cases, the administrators granted permission without hesitation.

2) Development of evaluation instruments. In early May, 1981 a copy of the curriculum materials was sent to Research Coordinating Unit personnel, and a content analysis was performed to identify instructional objectives. Test items related to the objectives were written and submitted to a committee for review. This review committee was made up of two program consultants from the Office of Vocational Education Research Coordinating Unit, one program consultant

from the Office of Research in the South Carolina Department of Education, the Office of Vocational Education Assistant Supervisor for Trade and Industrial Education, the project coordinator from the Curriculum Development Section, and two Industrial Sewing teachers who had participated in the development of the materials. The review committee examined the items for content validity and technical quality. Based on information gathered during this process, revisions in the items were made. The items were then compiled into test booklets and printed for use during the study.

3) Conduct of an orientation workshop for participating teachers. In early August, 1981 an orientation workshop was held for participating teachers. During this meeting, the field test procedures were explained, the materials were distributed, and the implementing teachers were given instructions as to the use of the materials.

4) Administration of achievement tests in the implementing and control group classes. Achievement tests were administered four times during the project year. At the first of each semester, before instruction began, a pretest covering content which was to be taught was administered. At the end of each semester, following instruction, a posttest was administered.

The first semester pretest was administered by Office of Vocational Education personnel who traveled to the various sites for this purpose. While the original plan called for all four tests to be administered in this way, a staff shortage which occurred after the project was under way necessitated a change in this plan. Therefore, the first semester posttest and both the pre and posttests for the second semester were mailed to the study sites along with directions for administration. The participating teachers then administered the tests and mailed them back to the Office of Vocational Education for analysis.

5) Observation visit. Each implementing classroom was visited once during the year to ascertain that the materials were being used as intended. The original plan called for a minimum of two such visits, but the previously mentioned staff shortage and resultant heavy work load prevented the second visit.

SECTION III

FINDINGS

Data Analysis

The goal of the control group design model used for the field test was to determine the extent to which student learning occurred in implementing classes compared to student learning in classes not using the instructional materials. To insure that this comparison was a meaningful one, pretest scores for the implementing and control groups were compared to determine whether the students in the two groups were alike, or "equal" with respect to knowledge of the course content before instruction began. Posttest scores for the two groups were then compared to determine whether the groups using the materials achieved significantly higher than did those not using the materials.

The project began without sufficient lead time to allow field testing of the evaluation instruments prior to their use in the project. However, an "after the fact" item analysis procedure was employed and the information obtained in this manner was used to:

1. Establish the reliability of the tests. Internal reliability indices (KR20) were calculated for each test. These indices ranged from .771 - .885, which are sufficiently high reliabilities to use the test data for decision making.

2. Examine the technical quality of individual test items. A discrimination index, a difficulty index, an item-total corelation, and a sensitivity index were calculated for each item used on the achievement tests. Further, each item was evaluated to determine the effectiveness with which the distracters in the item functioned. (An explanation of these item analysis procedures is not feasible here.

However, the interested reader is referred to Gronlund, N.E. Measurement and Evaluation in Teaching, 1976. for a brief but lucid treatment).

3. Based on the item analysis information, some poor items were deleted from the test. Other items were revised to remove ambiguity. The revised items were then retyped to be included in the final form of the curriculum materials for use by teachers as desired.

The test data for each semester were analyzed in the following ways: 1) an overall test score was calculated 2) the mean and standard deviation of pretest and posttest scores was calculated, 3) the difference between pretest scores and posttest scores for the two groups was calculated 4) t-tests indicating the significance of the difference between the mean scores were compiled, 5) the test items relating to each module were grouped into subtests representing achievement on the content in each module. Mean subtest scores for each group were then calculated and the same statistics described in reference to the overall test score were compiled.

Results

Examination of the first semester pretests indicate that the control group entered instruction with higher scores on all but three subtests (modules 4, 6, and 8) and on two of these subtests (modules 5 and 6) the difference in favor of the control group was significant at the .05 level (see table 2, page 11). The overall mean score on the first semester pretest was also slightly higher for the control group, but the difference was not statistically significant (see table 1, page 10).

The second semester pretest scores also indicate higher entry knowledge in the control group. Subtest scores were higher in the control group on all but one (module 18) and the difference was significant for six of the eleven subtests. On the one subtest which reflected a higher score in the experimental group, the

difference was slight and not statistically significant (see table 3, page 12). The overall second semester pretest score was higher for the control group and this difference was significant at the .01 level (see table 1, page 10).

First semester posttest scores were higher in the experimental group on all subtests (see table 2, page 11) and on the overall achievement score (see table 1, page 10). Furthermore, the differences between the experimental and control group scores were significant at the .05 level for the overall score and for five of the nine subtests.

On the second semester posttests the advantage in achievement scores also switches to the experimental group. Students who had been taught using the new materials scored higher on the overall test (see table 1, page 10) and on all but one of the subtests (see table 3, page 12). The differences in favor of the experimental group were significant at the .05 level for the overall score and for seven of the eleven subtests. On the one subtest for which the control group scored higher, the difference was slight and not statistically significant.

SECTION IV

CONCLUSIONS AND RECOMMENDATIONS

The objective of interest in this report was to "verify the extent to which student learning occurs following implementation of the instructional materials in the classroom." Analysis of the data gathered by means of pre and post achievement tests provides strong evidence that the materials are effective in this respect. In spite of an initial disadvantage with respect to entry knowledge, the experimental group obtained higher posttest mean scores and in most cases the differences between the mean scores in the two groups were significant.

Because of a tight time schedule, the analysis of the data used for making necessary revisons in the materials was taking place in the Curriculum Development Section concurrently with the preparation of this report in the Research Coordinating Unit. However, the achievement test results were communicated to the project director orally, and it was recommended that particular attention be paid to suggested revisions in those modules for which the posttest scores were not significantly higher in favor of the experimental group. Even without revisions, however, the data indicate that students taught using these materials do achieve higher following instruction and distribution of these materials should provide a useful resource for teachers of Industrial Sewing in the state.

TABLE 1

Pre and Posttest Results for
Experimental (E) and Control (C) Groups

Measure	E Group			C Group			T-Test of Difference Between E and C Group Means
	N[1]	Mean	SD[2]	N[1]	Mean	SD[2]	
1st Semester Pretest	185	27.36	8.18	171	28.50	8.15	1.31
1st Semester Posttest	185	37.52	8.75	158	34.89	9.61	-2.66*
2nd Semester Pretest	175	12.15	5.44	172	13.17	5.69	1.70**
2nd Semester Posttest	175	17.76	7.80	172	14.34	7.86	-4.07*

NOTES: **Indicates significance at the .01 level of significance.*

***Indicates significance at the .05 level of significance.*

[1]*Figures in this column indicate the number of students included in the analysis.*

[2]*Figures in this column indicate standard deviation.*

TABLE 2

First Semester Pre and Post Subtest Results
for Experimental (E) and Control (C) Groups

Subtests	PRETEST					POSTTEST				
	Group	N[1]	Mean	SD[2]	T[3]	Group	N[1]	Mean	SD[2]	T[3]
Module 1 Operating a Single Needing Lockstitch Machine	E	185	4.59	2.50	1.24	E	185	8.77	2.78	-1.94**
	C	170	4.92	2.51		C	158	8.18	2.76	
Module 2 Using Mathematics in the Needle Trades	E	151	1.68	1.72	0.18	E	172	2.60	2.10	-1.42
	C	142	1.72	1.80		C	145	2.28	2.00	
Module 3 Constructing Darts	E	180	1.92	1.13	0.86	E	185	2.27	1.13	-0.36**
	C	168	2.02	1.07		C	154	2.28	1.06	
Module 4 Sewing Seams	E	180	2.02	1.17	-0.68	E	185	2.40	1.13	-2.17**
	C	169	1.94	1.06		C	155	2.13	1.17	
Module 5 Sewing Out and Setting Collars	E	185	3.55	1.95	2.39**	E	185	4.89	2.06	-2.77**
	C	171	4.04	1.91		C	158	4.[illegible]4	2.29	
Module 6 Making and Setting Cuffs	E	172	0.88	0.69	-0.31	E	184	1.15	0.71	-2.05**
	C	157	0.85	0.74		C1	145	0.99	0.71	
Module 7 Constructing and Setting Sleeves	E	180	1.29	0.97	0.89	E	185	4.72	2.05	-2.03**
	C	169	1.38	0.91		C	157	4.27	1.98	
Module 8 Setting Zippers	E	185	1.59	1.11	-0.41	E	185	2.09	1.31	-1.16
	C	171	1.54	1.20		C	157	1.92	1.27	
Module 9 Constructing and Setting Pockets	E	178	1.98	1.08	2.23**	E	185	2.58	1.06	-1.06
	C	166	2.25	1.11		C	155	2.46	1.03	

NOTES: [1]Figures in this column indicate the number of students included in the analysis.

[2]Figures in this column indicate standard deviation.

[3]Figures in this column indicate results of the t-test for the significance of the difference between the group means.

*Indicates significance at the .01 level.

**Indicates significance at the .05 level.

TABLE 3

Second Semester Pre and Post Subtest Results
for Experimental (E) and Control (C) Groups

Subtests	PRETEST					POSTTEST				
	Group	N[1]	Mean	SD[2]	T[3]	Group	N[1]	Mean	SD[2]	T[3]
Module 10 The Serger (Overlock) Machine	E	175	2.57	1.46	0.14	E	175	2.23	1.43	-3.46**
	C	172	2.59	1.35		C	172	1.74	1.21	
Module 11 The Blindstitch Machine	E	175	2.54	1.61	1.83*	E	175	3.30	1.78	-1.40
	C	172	2.87	1.68		C	172	3.03	1.87	
Module 12 The Button Sew Machine	E	175	1.21	0.93	1.78*	E	175	2.10	1.03	-4.54**
	C	172	1.04	0.86		C	172	1.59	1.04	
Module 13 The Buttonhole Machine	E	175	0.45	0.54	1.71*	E	175	1.18	0.82	-3.43**
	C	172	0.55	0.61		C	172	0.89	0.77	
Module 14 The Zig Zag Machine	E	175	1.05	0.85	2.40**	E	175	1.59	1.17	-2.72**
	C	172	1.27	0.88		C	172	1.27	1.07	
Module 15 The Knife Machine	E	175	0.24	0.43	0.09	E	175	0.41	0.50	-2.75
	C	172	0.24	0.43		C	172	0.32	0.47	
Module 16 The Bar Tack Machine	E	175	0.15	0.36	2.10**	E	175	0.54	0.50	0.72
	C	172	0.24	0.43		C	172	0.58	0.50	
Module 17 The Double-Needle Felling Machine	E	175	1.14	0.93	1.16	E	175	1.67	1.00	-2.94**
	C	172	1.26	0.98		C	172	1.35	1.06	
Module 18 The Chainstitch Machine	E	175	0.46	0.60	-0.42	E	175	1.16	0.74	-1.60
	C	172	0.44	0.59		C	172	1.03	0.78	
Module 19 Special Attachments	E	175	2.16	1.47	1.04	E	175	3.35	1.82	-4.30**
	C	172	2.33	1.59		C	172	2.53	1.75	
Module 20 Special Operation:	E	175	0.36	0.48	2.98**	E	175	0.70	0.46	-3.03**
	C	172	0.52	0.50		C	172	0.54	0.50	

NOTES: [1]*Figures in this column indicate the number of students included in the analysis.*

[2]*Figures in this column indicate standard deviation.*

[3]*Figures in this column indicate results of the t-test for the significance of the difference between the group means.*

**Indicates significance at the .01 level.*

***Indicates significance at the .05 level.*

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Glossary of Technical Terms

DIFFICULTY INDEX: An indication of the difficulty of a test item based on the percentage of pupils who answer the item correctly.

DISCRIMINATION INDEX: An indication of the degree to which a test item discriminates between pupils with high and low achievement on the total test.

ITEM ANALYSIS: A set of procedures used to examine the items on a test after it has been taken by a group to determine how well the individual items function.

ITEM-TOTAL CORRELATION: An indication of the degree to which pupils who score high on the total test also tend to respond correctly to an individual test item.

MEAN: Arithmethical average of a set of scores.

RELIABILITY: The degree to which test instruments yield consistent results.

SENSITIVITY INDEX: An indication of the degree to which the number of correct responses to an item increases following instruction.

SIGNIFICANCE: An indication of the likelihood that statistical results could have occurred by chance alone.

SIGNIFICANCE LEVEL: An indication of the number of times out of one-hundred that results could have occurred by chance. For example, if a difference between test scores in two groups is significant at the .05 level, this indicates that a difference as large would occur by chance alone only five times out of one-hundred. Since this is not very likely we conclude that the difference is probably not due to change, but to the research treatment (in this case, use of the curriculum materials).

STANDARD DEVIATION: An indication of the degree to which scores in the group tend to vary from the mean score.

T-TEST: A statistical test which indicates the significance of the difference between scores in two groups.